44563A

# REDLINED VERSION OF THE DESIGNATED PARAGRAPHS

Page 1, line 20

Automobile and truck engines typically have their valve train components covered with covers designed to protect the valves and internal components from a variety of external contaminants and to contain engine oil and combustion gases within the engine for proper disposal. These covers are variously referred to as valve covers, rocker covers, cam covers and the like. Traditionally these valve covers have been made from metal materials such as steel, magnesium, or aluminum. Recently, in order to reduce cost and weight, valve covers have been made from thermoset plastic materials or thermoplastic materials which can withstand the high underhood temperature environment, see for example, US Patent 5,492,086 US Patent 5,375,569, US Patent 5,746,168 and US Patent ~~5,363,759~~5,636,759. Typically the valve covers are attached to the engine by bolting the valve cover to the cylinder head. In order to seal the internal engine components from the outside environment and contain engine oil and combustion gases a gasket is disposed between the valve cover and the cylinder head.

Page 5, line 31

Furthermore, the adhesive must be able to withstand exposure to hydrocarbon materials, engine oil, calcium chloride, brake fluid, glycol coolants, windshield washer solvents and the like, at the above-mentioned temperatures and the pressures to which the internal combustion engine reaches internally. The adhesive must be able to bond to the material used to make the valve cover and to the material from which cylinder heads are prepared, such as, cast iron, aluminum and magnesium. The adhesive used is a structural adhesive which is an adhesive which has sufficient cohesive strength to hold the valve cover in place during normal operating conditions. Preferably, the cohesive strength measured in Lap Shear mode according to ASTM D3165-91 or in tensile mode according to ASTM D638 Type 4 is 250 psi (1724 kPa) or greater, more preferably 500 (3447 kPa) or greater and most preferably 1000 psi (6895 kPa) or greater.

The adhesive used can be cured via a variety of known mechanisms including heat cure, infrared cure, ultraviolet cure, chemical cure, solvent loss and moisture cure. In another embodiment the adhesive can be a cure-on-demand adhesive which requires a separate operation to cause the adhesive to begin to cure. In one embodiment this is achieved by using an encapsulated curing agent which needs to be ruptured. In another embodiment this is achieved by removing a protective coating to expose the adhesive to ambient conditions. Cure can be initiated by exposing the adhesive to heat, infrared or ultraviolet light sources, or to shearing forces and the like. Preferably the adhesive is a high temperature epoxy resin, a polyimide, a ~~hi bred~~ hybrid polyimide/epoxy resin adhesive, a silicone, a fluorosilicone, an alkylborane initiated acrylic adhesive system, or an epoxy novolac/nitrile rubber adhesive High temperature adhesive means an adhesive which when cured can withstand exposure to the temperatures mentioned above without decomposing or delaminating from the substrate.

Page 12, line 18

Figure 8 shows a two part valve cover (40) where the upper portion (41) can be separated from the lower portion (42) to allow access to enclosed engine parts. Figure 9 shows an exploded view of the two piece valve cover (40) and the engine head (43). Shown is the upper portion (41) of the valve cover (40) having a female opening (45) which is located about the entire perimeter of the upper portion (41) of the valve cover (40) and adapted to receive the male protrusion (44) of the lower portion (42) of the valve cover (40). The male protrusion (44) extends about the perimeter of the lower portion (42) of the valve cover (40). The female opening (45) has indentations (46) perpendicular to the indentation of the female opening (45) adapted to receive perpendicular protrusions (47) on the male protrusion (44) of the lower portion of the valve cover (42). The perpendicular protrusions (47) are perpendicular to the direction of the male protrusion (44). The indentations (46) and the perpendicular protrusions (47) serve to lock the upper portion (41) of the valve cover (40) to the lower portion (42) of the valve cover (40). Also illustrated is the area where adhesive is to be applied (~~47~~49). Figure 10 shows the two-part valve cover (40) attached to the engine head (43) using an

adhesive (49). Figure 10 also shows the upper portion (41) and the lower portion (42) of the valve cover (40) assembled wherein the male protrusion (44) of the lower portion (42) is located within the female opening (45) of the upper portion (41) and locked by the perpendicular protrusions (47) of the male protrusion (44) being located in the indentations (46) of the female opening (45).

44563A

REDLINED VERSION OF THE CLAIMS

WHAT IS CLAIMED IS:

1. (Amended) A valve cover assembly comprising a valve cover having a mating surface adapted to be attached to a cylinder head of an internal combustion engine having a continuous bead of an adhesive disposed on the perimeter of the mating surface of the valve cover wherein the adhesive has sufficient adhesive strength to hold the valve cover in place during normal operating conditions.

2. (Amended) A valve cover assembly according to Claim ~~1~~26 wherein the valve cover does not have bolt holes which have a primary function of holding the valve cover to the cylinder head.

3. (Amended) A valve cover assembly according to Claim ~~1~~26 wherein the adhesive is a cure-on-demand adhesive.

4. (Amended) A valve cover assembly according to Claim ~~1~~26 wherein the valve cover is fabricated from a plastic material.

5. A valve cover assembly according to Claim 4 wherein the valve cover further comprises one or more integral means for holding the valve cover in place on a cylinder head while the adhesive cures.

6. A valve cover assembly according to Claim 4 wherein the valve cover comprises a blend of nylon 6,6, nylon 6 or a mixture thereof with syndiotactic polystyrene.

7. A valve cover according to Claim 4 wherein the valve cover further comprises one or more access ports adapted to allow access to the cylinder head without removal of the valve cover and one or more means for covering and sealing the one or more access ports.

~~8.A valve cover according to Claim 4 comprising two parts, a top portion and a lower portion, where the top portion of the valve cover can be removed from the lower portion valve cover to provide access to the cylinder head via an access port resulting from removing the top portion of the valve cover.~~

~~9. A valve cover assembly according to Claim 7 wherein each access port has a lid which can be mechanically fastened to the access port.~~

~~10. A valve cover assembly according to Claim 9 wherein one or more of the lids for the one or more access ports further contains a coil, pcv system components, a fuel rail or the like.~~

11. (Amended) An engine assembly comprising one or more valve covers having mating surfaces and one or more cylinder heads having mating surfaces adapted to fit to the mating surfaces of the valve covers wherein each valve cover is adhesively bonded to a cylinder head wherein a continuous layer of adhesive is disposed between the mating surfaces of each valve cover and the cylinder head to which each valve cover is bonded, wherein the continuous layer of adhesive forms a seal between the mating surface of each valve cover and cylinder head pair such that the transmission of gasses and liquids between each valve cover and cylinder head pair where the mating surfaces are in contact is significantly reduced or prevented and the adhesive has sufficient cohesive strength to to hold the valve cover in place during normal operating conditions.

12. (Amended) An engine assembly according to Claim ~~11~~28 wherein the valve cover is fabricated from a plastic material.

13. An engine assembly according to Claim 12 wherein the valve cover further comprises one or more integral means for holding the valve cover in place on a cylinder head while the adhesive cures.

14. An engine assembly according to Claim 12 wherein the valve cover further comprises one or more access ports adapted to allow servicing the cylinder head without removal of the valve cover and one or more means for covering and sealing the one or more access ports.

~~15. An engine assembly according to Claim 12 where the top portion of the valve cover can be removed for the valve cover to provide access to the cylinder head via an access port resulting from removing the top portion.~~

~~16. An engine assembly according to Claim 14 wherein each access port has a lid which can be mechanically fastened to the access port.~~

~~17. An engine assembly according to Claim 16 wherein one or more of the lids for the one or more access ports further contains a coil, a pcv system component, a fuel rail or the like.~~

18. (Amended) A method for bonding a valve cover to a cylinder head comprising

a) applying to the valve cover or the cylinder head, wherein the valve cover has a mating surface adapted to be mated with a mating surface of a cylinder head, a continuous bead or film of adhesive along the entire mating surface of the valve cover or the cylinder head wherein the adhesive has sufficient cohesive strength to hold the valve cover in place during normal operating conditions;

b) contacting the mating surface of the valve cover with the mating surface of the cylinder head such the continuous bead or film of adhesive is disposed between the mating surfaces of the valve cover and the cylinder head;

c) curing the adhesive to form a permanent bond between the mating surfaces of the valve cover and the cylinder head wherein the adhesive forms a seal between the valve cover and the cylinder head.

19. (Amended) A method according to Claim ~~18~~ 30 wherein the adhesive is a cure-on-demand adhesive and the adhesive bead is contacted with the valve cover mating surface in a location remote from the location wherein the valve cover is contacted with the cylinder head.

20. A method according to Claim 19 wherein the adhesive is activated just prior to contacting the valve cover with the cylinder head.

21. (Amended) A method according to Claim 20 wherein the adhesive is activated by exposure to a heat source just prior to contacting the valve cover with the cylinder head.

22. The method of Claim 21 wherein the valve cover mating surface and the cylinder head mating surface are maintained in contact, with the adhesive bead or film disposed between them, through the use of a mechanical fastening means other than bolts.

23. The method of Claim 22 wherein the mechanical fastening means is integrally attached to valve cover and/or the cylinder head.

~~24. A valve cover comprising a plastic material having one or more ports which have a sealing lid which can be removed from the valve cover.~~

~~25. A valve cover according to Claim 24 wherein each sealing lid has attached to it a pcv system component, coil or a fuel rail wherein when the valve cover and sealing lid(s) are assembled the pcv system component, coil or fuel rail are located inside the valve cover.~~

26. (New Claim) The valve cover assembly according to Claim 1 wherein the adhesive demonstrates a cohesive strength of 250 psi or greater when measured in lap shear mode according to ASTM D3165-91 or in tensile mode according to ASTM D638 type 4.

27. (New Claim) The valve cover according to Claim 26 wherein the adhesive comprises a high temperature epoxy resin, a polyimide, a hybrid polyimide/epoxy resin adhesive, a silicone, a fluorosilicone, an alkyl borane initiated acrylic adhesive system oran epoxy novolac/nitrile rubber adhesive.

28. (New Claim) The engine cover assembly according to Claim 11 wherein the adhesive demonstrates a cohesive strength of 250 psi or greater when measured in lap shear mode according to ASTM D3165-91 or in tensile mode according to ASTM D638 type 4.

29. (New Claim) The engine cover according to Claim 28 wherein the adhesive comprises a high temperature epxoy resin, a polyimide, a hybrid polyimide/epoxy resin adhesive, a silicone, a fluorosilicone, an alkyl borane initiated acrylic adhesive system or an epoxy novolac/nitrile rubber adhesive.

30. (New Claim ) The process according to Claim 18 wherein the adhesive demonstrates a cohesive strength of 250 psi or greater when measured in lap shear mode according to ASTM D3165-91 or in tensile mode according to ASTM D638 type 4.

31. (New Claim) The process according to Claim 30 wherein the adhesive comprises a high temperature epoxy resin, a polyimide, a hybrid polyimide/epoxy resin adhesive, a silicone, a fluorosilicone, an alkyl borane initiated acrylic adhesive system or an epoxy novolac/nitrile rubber adhesive.

32. (New Claim) The engine assembly of Claim 28 wherein the valve cover and engine head do not have bolts and bolt holes to hold the valve cover in place.